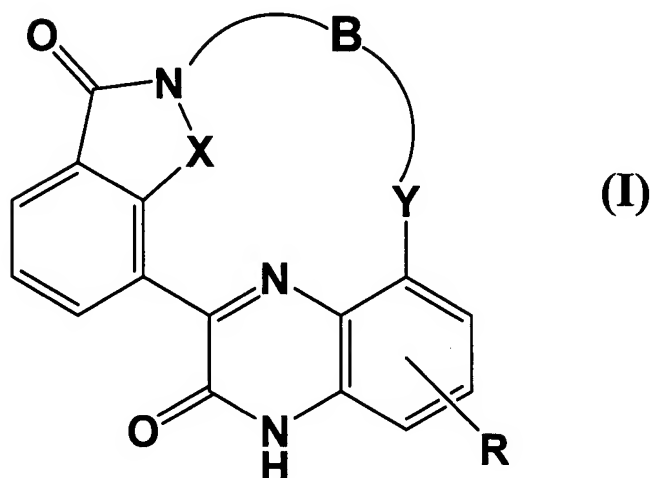


AMENDMENTS TO THE CLAIMS

1. (Currently amended) A quinoxalinone derivative of the formula (I):

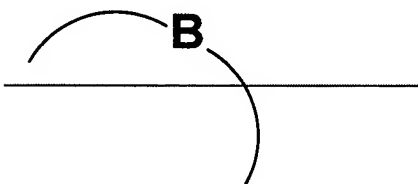


or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

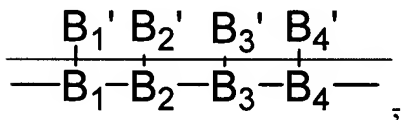
X is NH, S, O ~~or CH<sub>2</sub>~~;

Y is O or NR', wherein R' is hydrogen or lower alkyl;

~~the partial structure~~



~~is the following formula:~~



~~wherein B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub> are each independently CH, CR<sub>0</sub>, N or O, wherein~~

~~when B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub> are each independently O, then B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub> and B'<sub>4</sub> are each taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>, respectively, to form O, with the proviso that two or more members of B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>, at the same time, are not taken together with B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub> and B'<sub>4</sub>, respectively, to form O; and~~

~~R<sub>0</sub> is lower alkyl, and~~

~~\_\_\_\_\_ B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub> and B'<sub>4</sub> are each independently hydrogen, halogen, hydroxy, oxo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein~~

~~\_\_\_\_\_ said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and~~

~~\_\_\_\_\_ among B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub> and B'<sub>4</sub>,~~

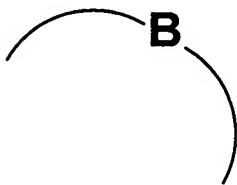
~~B'<sub>1</sub> and B'<sub>3</sub> taken together with B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>,~~

~~B'<sub>2</sub> and B'<sub>4</sub> taken together with B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>, or~~

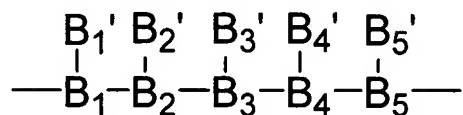
~~B'<sub>1</sub> and B'<sub>4</sub> taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>~~

~~may form a C<sub>5</sub>-C<sub>6</sub> cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β<sub>1</sub> mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below; or~~

the partial structure



is the following formula:



wherein

B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub> are each independently CH, CR<sub>0</sub>, N or O, wherein

when B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub> are each independently O, then B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub> and B'<sub>5</sub> are each taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>, respectively, to form O, with the proviso that two or more members of B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>, at the same time, are not taken together with B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub> and B'<sub>5</sub>, respectively, to form O; and

R<sub>0</sub> is lower alkyl, and

B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub> and B'<sub>5</sub> are each independently hydrogen, halogen, hydroxy, oxo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein

said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and

among B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub> and B'<sub>5</sub>,

B'<sub>1</sub> and B'<sub>3</sub> taken together with B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>,

B'<sub>2</sub> and B'<sub>4</sub> taken together with B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>,

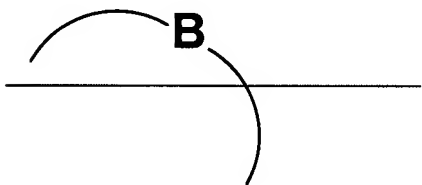
B'<sub>3</sub> and B'<sub>5</sub> taken together with B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>,

B'<sub>1</sub> and B'<sub>4</sub> taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>, or

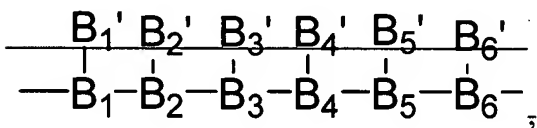
B'<sub>2</sub> and B'<sub>5</sub> taken together with B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>

may form a C<sub>5</sub>-C<sub>6</sub> cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β<sub>1</sub> mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below; or

the partial structure



is the following formula:



wherein

B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>, B<sub>5</sub> and B<sub>6</sub> are each independently CH, CR<sub>0</sub>, N or O, wherein

when B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>, B<sub>5</sub> and B<sub>6</sub> are each independently O, then B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub>, B'<sub>5</sub> and B'<sub>6</sub> are each taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>, B<sub>5</sub> and B<sub>6</sub>, respectively, to form O, with the proviso that two or more members of B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub>, B<sub>5</sub> and B<sub>6</sub>, at the same

~~time, are not taken together with B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub>, B'<sub>5</sub> and B'<sub>6</sub>, respectively, to form O;~~

~~and~~

~~—— R<sub>0</sub> is lower alkyl, and~~

~~—— B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub>, B'<sub>5</sub> and B'<sub>6</sub> are each independently hydrogen, halogen, hydroxy, exo, lower alkoxy, amino, lower alkylamino, di-lower alkylamino, lower alkyl or lower alkenyl, wherein~~

~~—— said lower alkyl and said lower alkenyl may be substituted with one or more, same or different substituents selected from the group consisting of hydroxy, lower alkoxy, amino and lower alkylamino, and~~

~~—— among B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub>, B'<sub>5</sub> and B'<sub>6</sub>,~~

~~B'<sub>1</sub> and B'<sub>3</sub> taken together with B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>,~~

~~B'<sub>2</sub> and B'<sub>4</sub> taken together with B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>,~~

~~B'<sub>3</sub> and B'<sub>5</sub> taken together with B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>,~~

~~B'<sub>1</sub> and B'<sub>4</sub> taken together with B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub> and B<sub>4</sub>, or~~

~~B'<sub>2</sub> and B'<sub>5</sub> taken together with B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub>~~

~~may form a C<sub>5</sub>-C<sub>6</sub> cycloalkyl or an aliphatic heterocyclic group selected from the substituent group β<sub>1</sub> mentioned below, and said cycloalkyl and said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group α mentioned below;~~

R is hydrogen, lower alkyl, lower alkenyl, amino in which the nitrogen atom is di-substituted with R<sub>a</sub> and R<sub>b</sub>, amino-lower alkyl in which the nitrogen atom is di-substituted with R<sub>a</sub> and R<sub>b</sub>, or L, wherein R<sub>a</sub> and R<sub>b</sub> are each independently hydrogen, lower alkyl, lower alkoxyalkyl or halogenated lower alkyl, and L is L<sub>1</sub>-L<sub>2</sub>-L<sub>3</sub>, wherein L<sub>1</sub> is a single bond, -(CH<sub>2</sub>)<sub>k1</sub>-, -(CH<sub>2</sub>)<sub>k1</sub>-O- or -(CH<sub>2</sub>)<sub>k1</sub>-NH-, in which k<sub>1</sub> is an integer of 1 to 3; L<sub>2</sub> is a single bond or -(CH<sub>2</sub>)<sub>k2</sub>-, in which k<sub>2</sub> is an integer of 1 to 3; and L<sub>3</sub> is lower alkyl, lower alkoxy, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, phenyl, pyridyl, pyrrolidinyl or piperidinyl, said lower alkyl, lower alkoxy, C<sub>3</sub>-C<sub>6</sub> cycloalkyl, phenyl, pyridyl, pyrrolidinyl or piperidinyl being optionally substituted with one or more fluorine atoms; or alternatively

R is a substituent selected from the substituent group α mentioned below, which may be substituted with one or more, same or different substituents selected from the

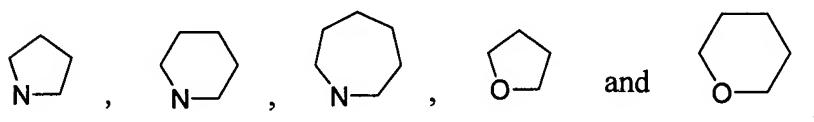
substituent group  $\gamma$  mentioned below, or R is lower alkyl substituted with said substituent; or alternatively

R is a cyclic group selected from the substituent group  $\beta_2$  mentioned below, which may be substituted with one or more, same or different substituents selected from a lower alkyl, the substituent group  $\alpha$  mentioned below and the substituent group  $\gamma$  mentioned below and also which may be substituted with J, wherein J is  $J_1$ - $J_2$ - $J_3$ ;  $J_1$  is a single bond,  $-\text{C}(=\text{O})-$ ,  $-\text{O}-$ ,  $-\text{NH}-$ ,  $-\text{NHCO}-$ ,  $-(\text{CH}_2)_{k3}-$  or  $-(\text{CH}_2)_{k3}-\text{O}-$ , in which  $k_3$  is an integer of 1 to 3;  $J_2$  is a single bond or  $-(\text{CH}_2)_{k4}-$ , in which  $k_4$  is an integer of 1 to 3; and  $J_3$  is lower alkyl, lower alkoxy,  $-\text{CONR}_a\text{R}_b$ , wherein  $\text{R}_a$  and  $\text{R}_b$  each have the same meaning as defined above, phenyl, pyridyl, pyrrolidinyl or piperidinyl, said lower alkyl, lower alkoxy, phenyl, pyridyl, pyrrolidinyl or piperidinyl being optionally substituted with one or more fluorine atoms, or R is lower alkyl substituted with said cyclic group, and

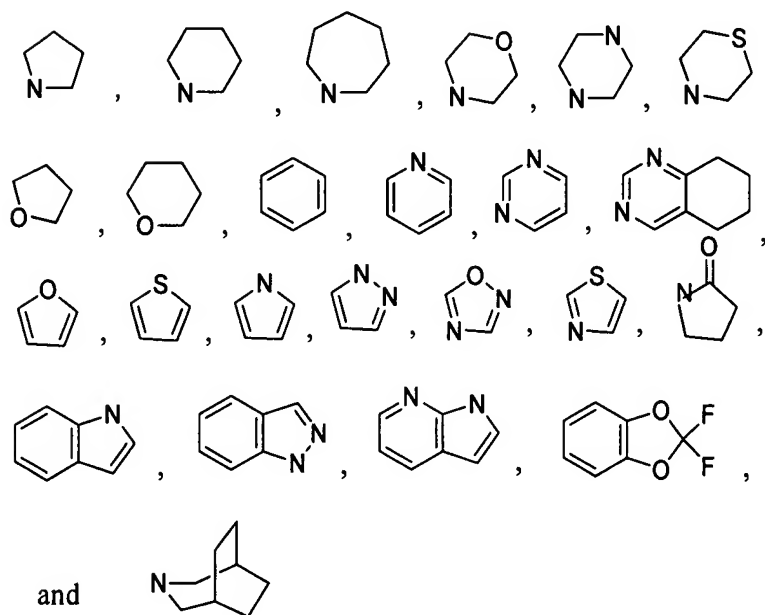
in the above, the substituent group  $\alpha$ , the substituent group  $\beta_1$ , the substituent group  $\beta_2$  and the substituent group  $\gamma$  each have the meanings shown below:

the substituent group  $\alpha$  is a member selected from the group consisting of hydroxy, hydroxy-lower alkyl, cyano, halogen, carboxyl, lower alkanoyl, lower alkoxy, lower alkoxyalkyl, amino, lower alkylamino, lower alkylsulfonyl, halogenated lower alkyl, halogenated lower alkoxy, halogenated lower alkylamino, nitro and lower alkanoylamino,

the substituent group  $\beta_1$  is a member selected from the group consisting of



the substituent group  $\beta_2$  is a member selected from the group consisting of



the substituent group  $\gamma$  is a member selected from the group consisting of

C<sub>3</sub>-C<sub>6</sub> cycloalkyl, lower alkyl substituted with C<sub>3</sub>-C<sub>6</sub> cycloalkyl, phenyl, lower alkyl substituted with phenyl, pyridyl, pyrrolidinyl and piperidinyl, said C<sub>3</sub>-C<sub>6</sub> cycloalkyl, phenyl, pyridyl, pyrrolidinyl and piperidinyl being optionally substituted with one or more fluorine atoms.

**2. (Currently amended)** The compound according to claim 1 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH ~~or S~~; and

Y is O.

**3. (Canceled)**

**4. (Currently amended)** The compound according to claim ~~3~~2 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, B<sub>4</sub> and B<sub>5</sub> are each independently CH; or

B<sub>1</sub>, B<sub>2</sub>, B<sub>4</sub> and B<sub>5</sub> are each independently CH, and B<sub>3</sub> is N or O.

**5. (Currently amended)** The compound according to claim 4 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the substituent group  $\alpha$  is selected from hydroxy, hydroxy-lower alkyl, halogen, lower alkoxy, lower alkoxyalkyl, lower alkylamino, methyl substituted with one to three fluorine atoms, methoxy substituted with one to three fluorine atoms and lower alkylamino substituted with one to three fluorine atoms; and the substituent group  $\beta_1$  is



**6. (Currently amended)** The compound according to claim 5 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

$B_1$ ,  $B_2$ ,  $B_4$  and  $B_5$  are each independently CH,  $B_3$  is N, and

(a) all of  $B'_1$ ,  $B'_2$ ,  $B'_3$ ,  $B'_4$  and  $B'_5$  are hydrogen; or

(b) one of  $B'_1$ ,  $B'_2$ ,  $B'_3$ ,  $B'_4$  and  $B'_5$  is lower alkyl or lower alkenyl, and all the others are hydrogen; or

(c) at least two of  $B'_1$ ,  $B'_2$ ,  $B'_3$ ,  $B'_4$  and  $B'_5$  are each independently lower alkyl or lower alkenyl, and all the others are hydrogen; or

(d) among  $B'_1$ ,  $B'_2$ ,  $B'_3$ ,  $B'_4$  and  $B'_5$ ,

$B'_1$  and  $B'_3$  taken together with  $B_1$ ,  $B_2$  and  $B_3$ ,

$B'_2$  and  $B'_4$  taken together with  $B_2$ ,  $B_3$  and  $B_4$ , or

$B'_3$  and  $B'_5$  taken together with  $B_3$ ,  $B_4$  and  $B_5$ ,

form an aliphatic heterocyclic group selected from the substituent group  $\beta_1$ , wherein said aliphatic heterocyclic group may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group  $\alpha$ , and the others are hydrogen, lower alkyl or lower alkenyl.

**7. (Currently amended)** The compound according to claim 6 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH;

$B_1$ ,  $B_2$ ,  $B_4$  and  $B_5$  are each independently CH, and  $B_3$  is N;

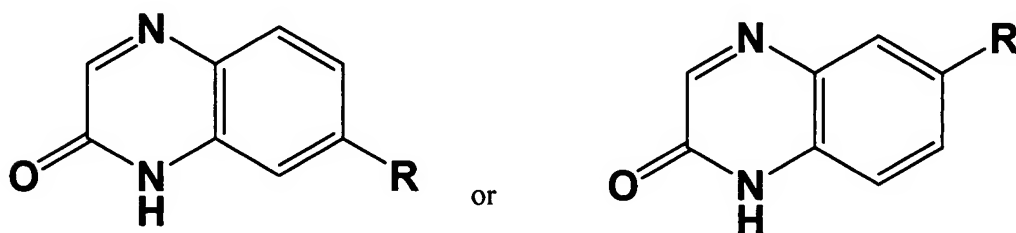
among B'<sub>1</sub>, B'<sub>2</sub>, B'<sub>3</sub>, B'<sub>4</sub> and B'<sub>5</sub>,

B'<sub>1</sub> and B'<sub>3</sub> taken together with B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub> form an aliphatic heterocyclic group selected from the substituent group  $\beta_1$ , wherein said aliphatic heterocyclic group may be substituted with lower alkyl, and the others are hydrogen.

**8. (Canceled)**

**9. (Currently amended)** The compound according to claim 6 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

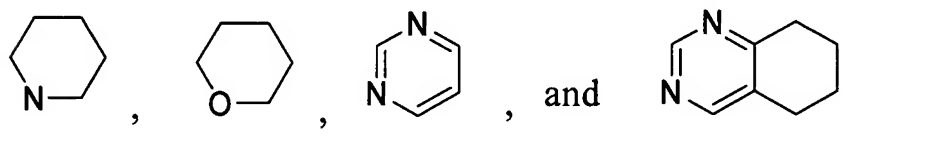
the R binds to quinoxalinone as described in the following formula:



**10. (Currently amended)** The compound according to claim 9 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

R is hydrogen, amino-lower alkyl in which the nitrogen atom is di-substituted with R<sub>a</sub> and R<sub>b</sub>, or L, wherein R<sub>a</sub> and R<sub>b</sub> are each independently lower alkyl, and L is L<sub>1</sub>-L<sub>2</sub>-L<sub>3</sub>, wherein L<sub>1</sub> is a single bond, -(CH<sub>2</sub>)<sub>k1</sub>-, -(CH<sub>2</sub>)<sub>k1</sub>-O- or -(CH<sub>2</sub>)<sub>k1</sub>-NH-, in which k<sub>1</sub> is an integer of 1 or 2; L<sub>2</sub> is a single bond or -(CH<sub>2</sub>)<sub>k2</sub>-, in which k<sub>2</sub> is an integer of 1 or 2; and L<sub>3</sub> is lower alkoxy or C<sub>3</sub>-C<sub>6</sub> cycloalkyl; or

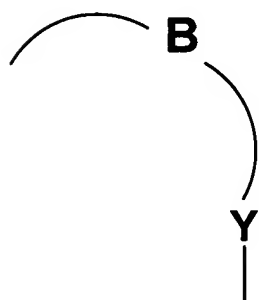
R is a cyclic group selected from the substituent group  $\beta_2$ , which may be substituted with one or more, same or different substituents selected from lower alkyl and the substituent group  $\alpha$ , or R is lower alkyl substituted with said cyclic group, wherein the substituent group  $\beta_2$  is selected from



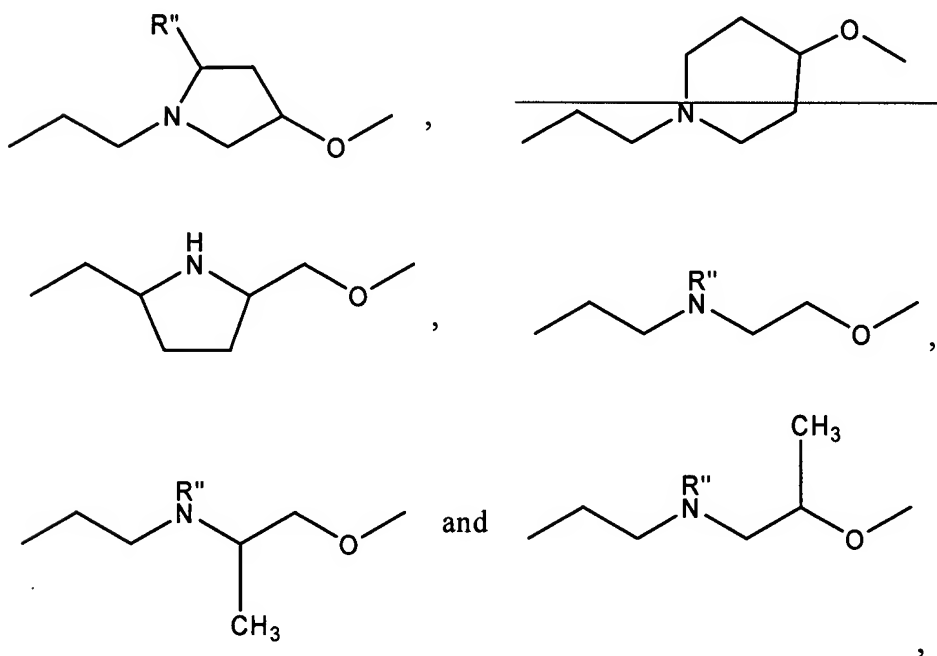


and the substituent group  $\alpha$  is selected from halogen, lower alkoxy, lower alkoxyalkyl, methyl substituted with one to three fluorine atoms, and methoxy substituted with one to three fluorine atoms; or lower alkyl substituted with a substituent selected from the group consisting of lower alkylamino and lower alkylamino substituted with one to three fluorine atoms.

**11. (Currently amended)** The compound according to claim 2 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein  
the partial structure

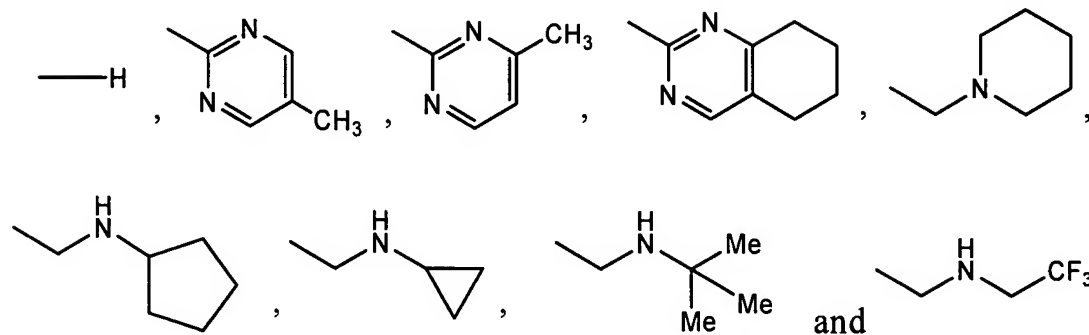


is selected from the group consisting of



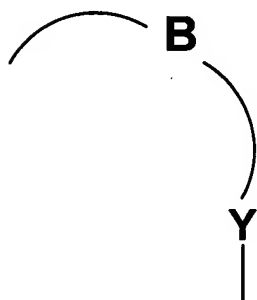
wherein R'' is hydrogen or methyl; and

R is selected from the group consisting of

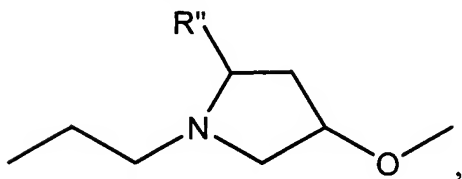


**12. (Currently amended)** The compound according to claim 11 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

X is NH; and the partial structure



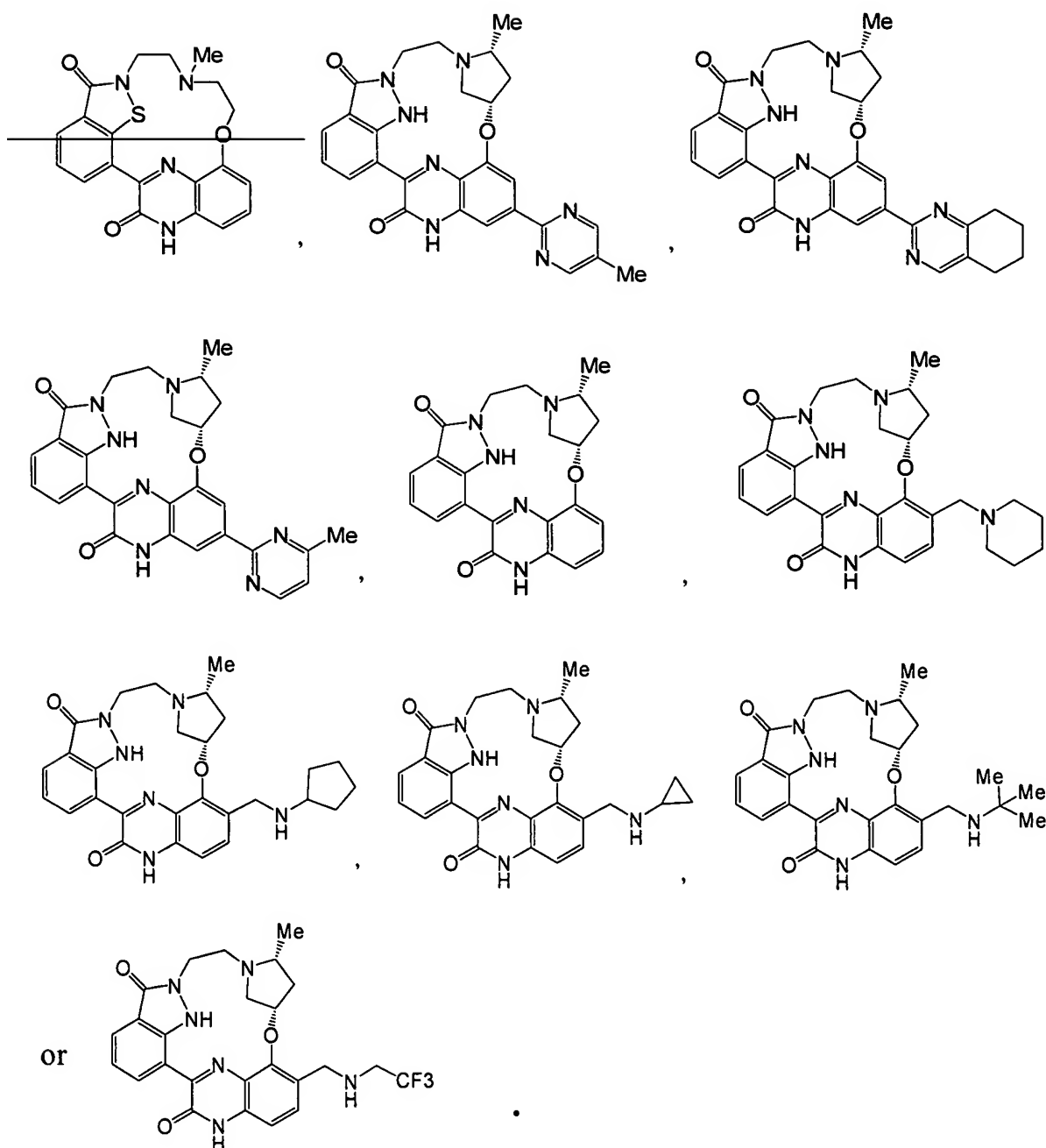
is the formula:



wherein R'' is methyl.

**13. (Currently amended)** The compound according to claim 1 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the quinoxalinone derivative is



**14. (Currently amended)** A pharmaceutical composition comprising ~~one or more~~ kinds of the a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

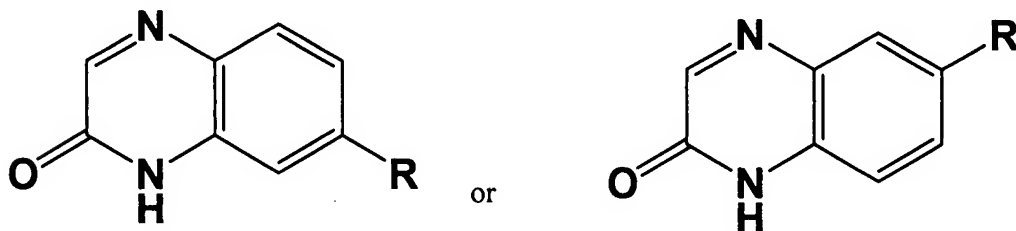
**15. (Currently amended)** A method of inhibiting ~~Cdk~~Cdk4, which comprises administering to a patient in need thereof a therapeutically effective amount of ~~one or~~

~~more kinds of the~~ a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

**16. (Currently amended)** A method for treatment of cancer selected from the group consisting of glioma (blastoma), breast, lung, gastrointestinal, endometrial, leukemia, head and neck, liver, ovary or testicular, and mesothelima, which comprises administering to a patient in need thereof a therapeutically effective amount of ~~one or more kinds of the~~ a quinoxalinone derivative according to claim 1 as an active ingredient, together with a pharmaceutically acceptable carrier or diluent.

**17. (Currently amended)** The compound according to claim 7 or a pharmaceutically acceptable salt ~~or ester~~ thereof, wherein

the R binds to quinoxalinone as described in the following formula:



**18. (Canceled)**